

AD-A080 713

SYSTEM PLANNING CORP ARLINGTON VA

F/8 18/8

ESTIMATING U.S. AND SOVIET LATENT PREWAR INDUSTRIAL MOBILIZATION--ETC(U)

JUN 79 L SULLIVAN, W S PAYNE

DCPA01-78-C-0274

UNCLASSIFIED

SPC-453-APP

NL

30
AUG-07-8

END
DATE
FILMED

3 - 80

DBI

12



SYSTEM PLANNING CORPORATION

1500 Wilson Boulevard • Suite 1500 • Arlington, Virginia 22209 • (703) 841-2800

SPC Log No. 88-0169
Copy

6 **ESTIMATING U.S. AND SOVIET LATENT PREWAR
INDUSTRIAL MOBILIZATION POTENTIALS,**

APPENDIX 10 SPC-453-APP

11 Jun 79

12 27

DDC
RECEIVED
FEB 14 1980
E

10 by
Leonard Sullivan, Jr.
W. Scott/Payne

Approved for Public Release:
Distribution Unlimited

For
Federal Emergency Management Agency
Washington, D.C. 20472

15 Contract No. DCPA 81-78-C-0274

Mr. George Divine
Contracting Officer's Technical Representative
Work Unit No. 4154A

This document has been approved
for public release and sale; its
distribution is unlimited.

4069-2
80 2 12 1985

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM	
1. REPORT NUMBER Appendix to SPC 453	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle) ESTIMATING U.S. AND SOVIET LATENT PREWAR INDUSTRIAL MOBILIZATION POTENTIALS		5. TYPE OF REPORT & PERIOD COVERED Appendix	
7. AUTHOR(s) Leonard Sullivan, Jr., M. Scott Payne		6. PERFORMING ORG. REPORT NUMBER NO-9169	
8. PERFORMING ORGANIZATION NAME AND ADDRESS System Planning Corporation 1500 Wilson Boulevard Arlington, Virginia 22209		9. CONTRACT OR GRANT NUMBER(s) DCPA01-73-C-0274	
11. CONTROLLING OFFICE NAME AND ADDRESS Federal Emergency Management Agency Mitigation and Research Attn: Administrative Officer Wash., D.C. 20472		10. PROGRAM ELEMENT PROJECT, TASK AREA & WORK UNIT NUMBERS Work Unit 4154A	
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE June 1979	
		13. NUMBER OF PAGES 24	
		15. SECURITY CLASS. (of this report) UNCLASSIFIED	
		16. DECLASSIFICATION/DOWNGRADING SCHEDULE	
18. DISTRIBUTION STATEMENT (of this Report) Approved for public release: Distribution unlimited.			
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)			
19. SUPPLEMENTARY NOTES			
20. KEY WORDS (Continue on reverse side if necessary; and identify by block number) Industrial mobilization Peacetime production Industrial workforce Military inventories Manufacturing capacity Industrial conversion Economic factors Wartime civil consumption			
21. ABSTRACT (Continue on reverse side if necessary; and identify by block number) This is an appendix to a study on the impact of Enhanced Mobilization Potential On Civil Preparedness Planning. It develops an estimate of the relative latent industrial mobilization potentials of the U.S. and the U.S.S.R. based on the pre- sently available industrial workforce and capacity for each nation. It concludes that the Soviets have the theoretical potential to shift the perceived balance of conventional forces substantially in their own favor during the first several years of a competitive industrial mobilization. If so, it presents another alter- native short of war by which the Soviets might attempt to intimidate the West. The impact of this finding is discussed in the basic study report.			

DD FORM 1473 1 JAN 75 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Accession For	
NTIS GMAAI	<input checked="" type="checkbox"/>
DEC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or special
A	

APPENDIX: ESTIMATING U.S. AND SOVIET LATENT PREWAR
INDUSTRIAL MOBILIZATION POTENTIALS

This Appendix describes the initial phase of a study that examines the impact of mobilization on civil preparedness planning. Clearly, in a number of superpower nuclear exchange scenarios both civil defense and emergency mobilization efforts may be carried out simultaneously. The purpose of the initial task is to estimate the relative mobilization potentials of the United States and the Soviet Union.

Implicit in such an investigation are such questions as who would benefit from such a pre-war competitive mobilization, and how difficult a task would it be for the U.S. Because of the limited scope of this contract, System Planning Corporation (SPC) has adopted an approach for this modest investigation that compares the available industrial labor pools for the U.S. and the U.S.S.R. under a set of plausible assumptions about the utilization of that manpower during a crisis mobilization period. This approach necessarily neglects such "real world" aspects as side effects on either country's economic structure, detailed bottlenecks that might develop in the industrial sector of either country, or the influence of specific raw material availabilities. The effort simply looks at the latent mobilization potential in terms of manpower available and industrial capacity available for their use. The effort stresses the use of comparative data to get comparative results; and while it utilizes, when available, absolute numbers, it places greater confidence in the relative numbers.

In the process of comparative examination, the task, with the help of some very knowledgeable consultants on both the U.S.S.R. and the U.S. industrial potential, has uncovered a substantial set of general parameters that indicate some interesting and fundamental differences between the two industrial economies. The basic message is that if they so choose, the Soviets likely can produce a rather rapid change in the balance of weapon inventories to their own favor. Such a capability has a substantive strategic value in changing the perceived balance of power and in acting as a deterrent to Western military resistance to openly planned Soviet aggression.

ESTIMATING U.S. AND SOVIET LATENT PREWAR INDUSTRIAL MOBILIZATION POTENTIALS

- Little prior work has been done in this area.
- The scope of the contract requires a simplified approach--using seasoned judgment where available.
- This analysis is based on relative estimates of available manpower and existing facilities.
- U.S. and Soviet estimates are made on an equivalent basis for valid comparisons.
- Relative capabilities may be more credible than absolute values.
- The analysis is performed for 1975-1976--the latest available year for equivalent estimates.
- The results combine highly aggregated data and professional judgment on 26 pertinent factors.
- Much more work would be required to identify "real-world" mobilization limits.

FACTORS FAVORING EACH SIDE'S LATENT MOBILIZATION POTENTIAL

UNITED STATES

- Workforce participation
- Standard of living
- Workforce composition
- Workforce distribution
- Relative education levels
- Ethnic/linguistic homogeneity
- Manpower for military mobilization
- Defense-related manufacturing
- Manufacturing workforce productivity
- Workforce substitution & augmentation
- Peacetime factory utilization
- Normal industrial capacity utilization
- Materials availability & substitution
- Usable civil capital stocks & production

SOVIET UNION

- Population and age distribution
- Economic sensitivities and incentives
- Military end-item inventories
- Peacetime military production rates
- Planned industrial conversion
- National preparation for mobilization
- Peacetime factory workshifts
- Maximum labor force workweek
- National coordination of civil sectors
- Restraint of civil consumption
- Manufacturing lead times
- Time required for full mobilization

Each of these factors, which influence the ability to undertake a maximum-effort industrial mobilization, are discussed both qualitatively and quantitatively on the following pages.

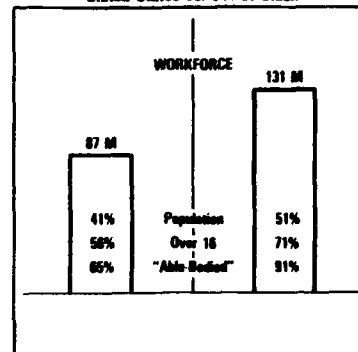
FACTORS FAVORING LATENT MOBILIZATION POTENTIAL OF:

UNITED STATES

WORKFORCE PARTICIPATION

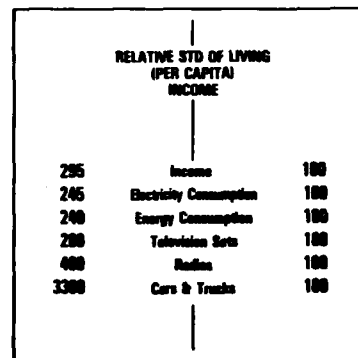
• The current Soviet total labor force is about 50 percent larger than that of the United States. From this standpoint, the Soviets have a far smaller residual population from which to draw additional workers during a mobilization phase. Given difficulties with geographic, urban/rural and ethnic distributions, and given the relatively unskilled nature of the residual, it appears that the Soviet Union will be forced to mobilize generally within its present workforce, while the United States could more easily expand its total labor force participation. Unemployed seeking work are excluded from the table.

United States vs. Soviet Union



STANDARD OF LIVING

• By almost any standard of comparison, the U.S. has a vastly more advanced standard of living than the U.S.S.R. On the one hand, this should mean that the U.S. can endure substantially more "belt-tightening" and sacrificing of non-essential industrial output. On the other hand, those accustomed to luxury and independence may find it more difficult to make such sacrifices. On balance, however, given suitable motivations, it would appear clear that the U.S. people could relinquish or defer more industrial output to a mobilization effort than could the Soviet people--if willing to do so.



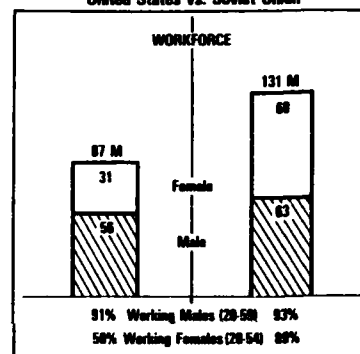
FACTORS FAVORING LATENT MOBILIZATION POTENTIAL OF:

UNITED STATES

WORKFORCE COMPOSITION

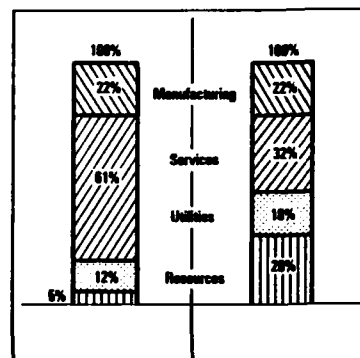
- The rigors of the Great Patriotic War (WWII) and subsequent political purges have left their mark on the size of the Soviet "able-bodied" population in the workforce. As a result, more than half of the current Soviet workforce is comprised of women--and will remain so until at least 1980. By comparison, only 38 percent of the U.S. workforce is female. Hence, the Soviet workforce contains only 12 percent more men than the U.S., but 120 percent more women. In short, "Rosie the Riveter" is already at work in the U.S.S.R., while she presents a substantial mobilization workforce reserve for the U.S.

United States vs. Soviet Union



WORKFORCE DISTRIBUTION

- There are substantial differences in distribution of U.S. and U.S.S.R. labor forces. Both countries employ roughly 22 percent of their workforces in manufacturing, and the U.S. employs substantially less in "Utilities" (power, communication, transportation, and construction). However, U.S. "Services" segment is almost twice as large as the Soviet counterpart, while U.S. employment in "Resources" (agriculture, forestry, fishing, and mining/quarrying) is a far smaller fraction of the workforce. Moreover, U.S.S.R. females contribute a very large workforce share of "Resources" (57 percent) and "Services" (69 percent). The two million U.S. and four million Soviet military personnel are counted within the "Services" category.



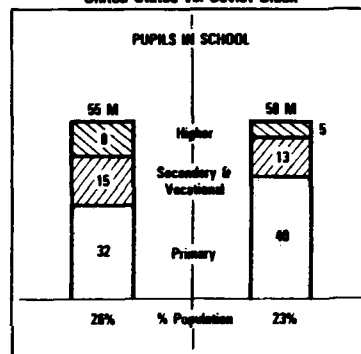
FACTORS FAVORING LATENT MOBILIZATION POTENTIAL OF:

UNITED STATES

RELATIVE EDUCATION LEVELS

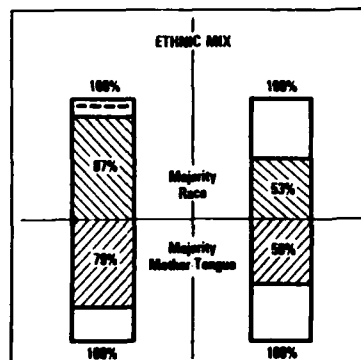
- To some minor extent, the ability to perform an industrial mobilization should be related to the educational level of the population. In this regard, the U.S. continues to have an advantage, although Soviet education is undoubtedly improving. Nonetheless, at this time only 44 percent of the Soviet population progresses beyond a primary school level, while 73 percent of U.S. students go on to secondary, vocational, or higher education. This current ratio is felt to be more representative of the older U.S. population than it would be for the "able-bodied" Soviet workforce already in place.

United States vs. Soviet Union



ETHNIC/LINGUISTIC HOMOGENEITY

- To some degree, the ability to "mobilize" resources to a single national purpose is eased by homogeneity of race and language. In this respect, the U.S. is in a far superior position. The 13 percent "minorities" in the U.S. include the 11 percent Negroes who form a vital segment of our labor force. On the other hand, over 40 percent of the Soviet population is non-Russian and has had a different mother tongue. Soviet "minorities" will, due to higher birth rates, become the majority before 1990. Unlike U.S. minorities that are thoroughly mixed into an homogeneous American culture, Soviet minorities are concentrated outside of Russia, are not assimilated culturally, and feel less allegiance to the central government.



FACTORS FAVORING LATENT MOBILIZATION POTENTIAL OF:

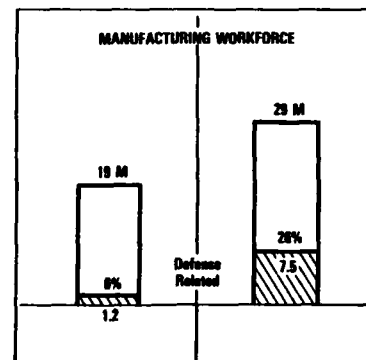
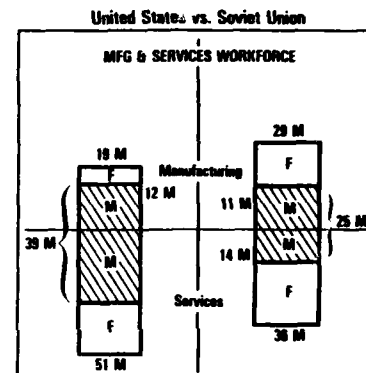
UNITED STATES

MANPOWER FOR MILITARY MOBILIZATION

• For purposes of this analysis, it is assumed that the major source (75 percent) of trained manpower for military service will have to come from the Manufacturing and Services sectors: Utilities and Resources are likely to be mobilized to increase their own outputs. Each side might expand their armed forces to four times peacetime levels. Due to the high fraction of Soviet women in their relatively small "Services" sector, it appears that a major source of "ready reserves" for the Soviets will be in their "Manufacturing" sector, while the U.S. can emphasize the drafting of manpower from their "Services" sector. This could produce a further reduction in Soviet productivity.

DEFENSE-RELATED MANUFACTURING

• Within the manufacturing sectors of the two countries, the Soviet peacetime emphasis on the production of military goods--in terms of labor used--is higher by a factor of roughly six. While this relationship strongly favors Soviet peacetime military inventories, it correspondingly provides less room for growth during a mobilization phase in the production of both durables and non-durables for the military.



FACTORS FAVORING LATENT MOBILIZATION POTENTIAL OF:

UNITED STATES

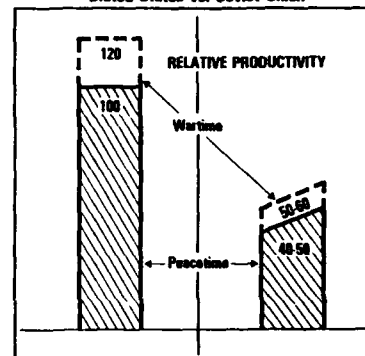
MANUFACTURING WORKFORCE PRODUCTIVITY

- It is generally recognized that Soviet manufacturing industries are more manpower-intensive than their U.S. counterparts, and that the total productivity of U.S.S.R. labor is 40 percent to 50 percent of equivalent American standards. Hence, even though the U.S.S.R. workforce devoted to manufacturing is over 50 percent larger, its total output is 25-40 percent less. Soviet productivity could be further reduced if very long workweeks are required, or if large workforce substitutions are required to free workers for military duty. Both workforces, however, are expected to be able to increase their productivity about 20 percent during times of national stress or crisis due to better capacity utilization and output standardization.

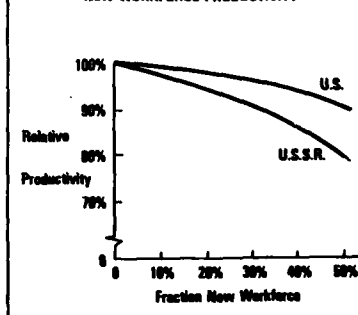
WORKFORCE SUBSTITUTION & AUGMENTATION

- There would appear to be little question that the machinery used in American industry is both more complex and more product-specific than its Soviet counterparts. Nonetheless, the latent skills of an expanded U.S. workforce would appear to be substantially higher. In a U.S. mobilization it would appear that fewer fully skilled workers need be lost to military duty, while more partially skilled workers will have to be drawn from the now idle population. Conversely, the Soviets may expand their workforce less, but have to substitute current workers with relatively unskilled people.

United States vs. Soviet Union



NEW WORKFORCE PRODUCTIVITY



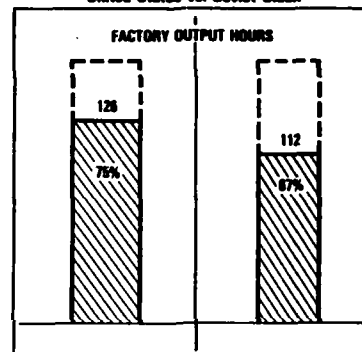
FACTORS FAVORING LATENT MOBILIZATION POTENTIAL OF:

UNITED STATES

MAXIMUM FACTORY UTILIZATION

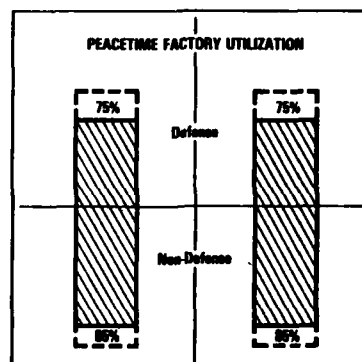
- It is estimated that greater efficiency of layout and more modern equipment will permit U.S. plants to operate more hours per week under maximum mobilization conditions. With little quantitative data on which to base an estimate, this analysis assumes that U.S. plants can operate up to 126 hours per week, while Soviet plants would not be able to maintain more than 112 hours per week of productive output. This corresponds to a six-hour-per-day shutdown in the U.S. versus eight hours per day in the U.S.S.R.--over a sustained mobilization period.

United States vs. Soviet Union



PEACETIME FACTORY UTILIZATION

- Neither the Soviets nor the U.S. make full use of their peacetime industrial capacity. The centrally planned economies tend to maintain "standby" facilities to assure their ability to meet quotas, and maintain older factories in existence even when they have been replaced by more modern units. The capitalist economies generally maintain plant capacity that exceeds normal demand as a hedge against future surges in sales. Although this might be an advantage for the U.S., not enough is known about Soviet plant utilization to warrant different indices for the two sides.



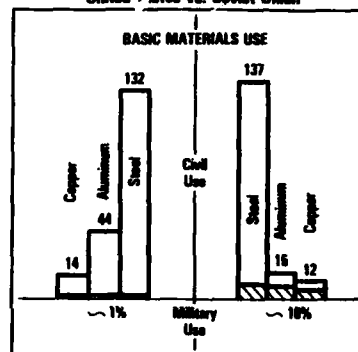
FACTORS FAVORING LATENT MOBILIZATION POTENTIAL OF:

UNITED STATES

MATERIALS AVAILABILITY & SUBSTITUTION

• The Soviet Union is clearly less dependent than the U.S. on external sources of raw materials; this should be an inherent advantage during mobilization. However, the U.S. has a far greater consumption of non-essential items for which material substitution or deferred purchase--as in World War II--could be accepted. Moreover, it is felt that "American ingenuity" and more extensive temporary recycling, as well as stockpiling of a few critical materials, will assure that our mobilization efforts will not be resource-constrained. Soviet resources are in fact more likely to be limiting--though not assumed so here.

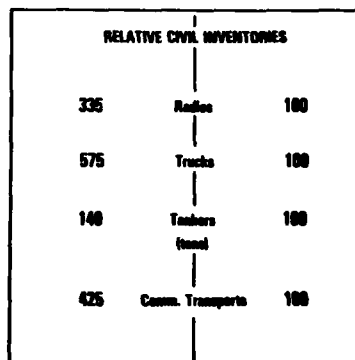
United States vs. Soviet Union



USABLE CIVIL CAPITAL STOCKS & PRODUCTION

• In times of great need, civil assets have frequently been commandeered or reworked for expedient military use. American civil sector stocks and production--from "CB" radios and motorcycles to trucks and supertankers--far exceed equivalent Soviet statistics. While not "optimized" for military use, such civil asset conversions in times of crisis are clearly better than nothing. (Boeing alone will turn out almost 500 commercial airliners in 1979--including 85 giant 747s.) A maximum U.S. mobilization effort would require adjusting military needs to commercial production, while the Soviets would adjust commercial production to military designs--an important difference.

RELATIVE CIVIL INVENTORIES



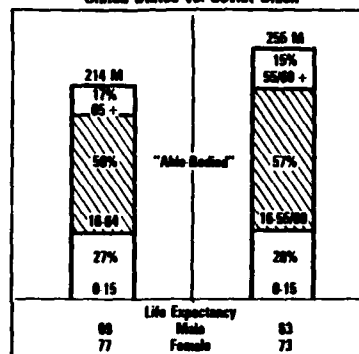
FACTORS FAVORING LATENT MOBILIZATION POTENTIAL OF:

SOVIET UNION

POPULATION AND AGE DISTRIBUTION

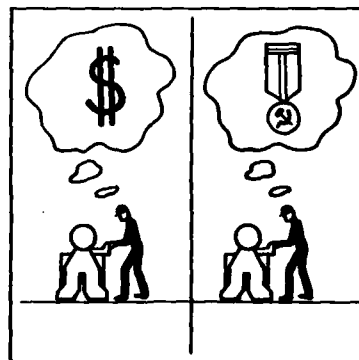
• The population of the Soviet Union is almost 20 percent larger than that of the United States, whereas life expectancy is somewhat less. While the U.S. considers 16-64 to be "able-bodied" (cross-hatched), the U.S.S.R. uses 16-54 for women and 16-59 for men. By this definition, 55.5 percent of U.S. and 56.3 percent of U.S.S.R. population are candidates for the workforce. In a "pinch" the Soviets would probably turn more to their younger people, as they have in the past, while the U.S. would probably concentrate more on extending the participation of their older people.

United States vs. Soviet Union



ECONOMIC SENSITIVITIES AND INCENTIVES

• The Soviets' controlled economy and non-capitalistic incentives may seem inefficient and burdensome to the West during peacetime. However, these factors become virtues during a mobilization phase. The Soviets can tightly control "demand," and can both motivate and relocate their workforce without resort to premium pay, bonuses, etc. Our Western economies will be more sensitive to inflationary pressures during a period of mobilization, and we are probably less capable of extracting either economic or materialistic sacrifices from our people, even in times of crisis. This will limit Western labor force expansion as well as non-essential industrial conversion, despite the use of World War II-type controls.



FACTORS FAVORING LATENT MOBILIZATION POTENTIAL OF:

SOVIET UNION

MILITARY END-ITEM INVENTORIES

- The Soviets clearly maintain substantially larger military forces and equipment inventories during peacetime than does the United States. To some extent, then, it may not be as necessary for the Soviet Union to be able to increase production sharply during a mobilization phase. Nonetheless, the Soviets clearly emphasize quantity over quality--by either choice or necessity--and are only "comfortable" with a substantial inventory advantage. In any event, a period of competitive mobilization would require demonstration of rapidly increased inventories of high priority weapon systems.

United States vs. Soviet Union

RELATIVE INVENTORIES

100	Manpower	190
100	Tanks & APCs	200
100	Artillery	300
100	Helicopters	115
100	Air Defenses	500
100	TAC Aircraft	130
100	Ballistic Missiles	175
100	Ships & Subs	190

PEACETIME MILITARY PRODUCTION RATES

- Large peacetime inventories of systems designed for only a moderate "useful life" require large production rates to permit normal equipment "turnover." Such high existing production rates clearly provide a superior foundation for increased production. Soviet production rates have consistently been adequate to prevent force "aging," while U.S. production rates have not, even for their longer-lived systems. This further exaggerates the "gap" in peacetime production rates, and further favors a U.S.S.R. advantage in rapidly increasing inventory levels.

RELATIVE PRODUCTION RATES

100	Tanks & APCs	270
100	Helicopters	300
100	TAC Aircraft	150
100	Ships & Subs	200

FACTORS FAVORING LATENT MOBILIZATION POTENTIAL OF:

SOVIET UNION

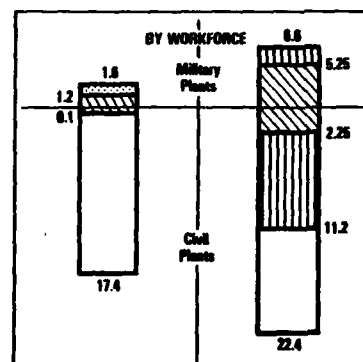
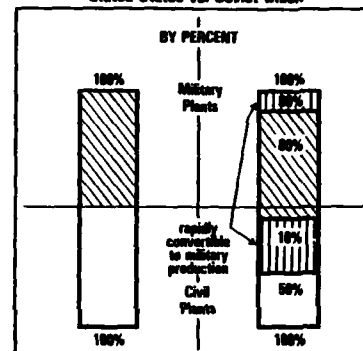
PLANNED INDUSTRIAL CONVERSION

• While the U.S. has no formal industrial conversion plans for mobilization (other than unused capacity), the U.S.S.R. has specifically combined civil production in military facilities, and military production in civil facilities, with standby tooling and support units to permit "overnight" conversion. This assures rapid conversion capability when needed. While exact numbers are not available, it is estimated that military factories can increase military production "instantly" by 20 percent, while civilian factories can increase their military output from about 10 percent to about 50 percent very rapidly. These indices exclude common military/civil production items--a small fraction of the total.

NATIONAL PREPARATION FOR MOBILIZATION

• There can be virtually no question the Soviet Union has made extensive industrial preparation for mobilization. Virtually all Soviet industry has both plans and facilities, and set-aside equipment for conversion of their plants to war production efforts. In fact, it seems likely that they are more constrained by a suitable labor force than by machinery and planning. Moreover, for various reasons (including a less efficient transportation system), most plants are better stocked with materials, semi-finished parts, and surplus machines. Moreover, more plants are "vertically integrated" to perform intermediate processes: considered inefficient by Western standards.

United States vs. Soviet Union



FACTORS FAVORING LATENT MOBILIZATION POTENTIAL OF:

SOVIET UNION

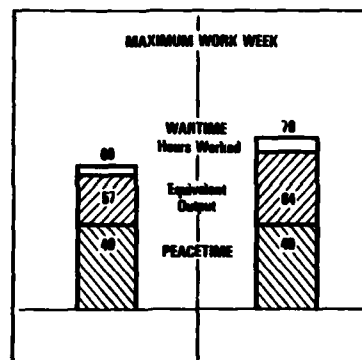
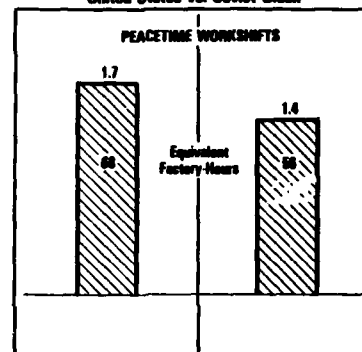
PEACETIME FACTORY WORKSHIFTS

• U.S. industry appears to have a substantially higher fraction of "continuous processes" requiring round-the-clock operation, as well as many more expensive automated machines which are only economically attractive when run for two or more shifts per day. Consequently, American industrial plants tend to operate a longer multi-shift workweek than their Soviet counterparts, even when not operating at "capacity." This provides the Soviets with a mobilization advantage because they can rapidly expand this idle capacity through more or longer work shifts.

MAXIMUM LABOR FORCE WORKWEEK

• The average manufacturing workweek was 39.4 hours in the U.S., and 40.7 in the U.S.S.R. in 1975. The Soviet labor force is probably better disciplined, however, and can be required to work long hours without complaint--if necessary. Moreover, the Soviet hierarchy is not averse to strong persuasion by other than monetary means. In fact, they can, if necessary, require segments of the labor force to move from one location to another without their families, or to live in barracks near their worksite. For these, and many other sociopolitical reasons, the U.S.S.R. can plan on a longer continuous workweek than can the U.S.--even though it is recognized that each additional hour is less productive than the last.

United States vs. Soviet Union



FACTORS FAVORING LATENT MOBILIZATION POTENTIAL OF:

SOVIET UNION

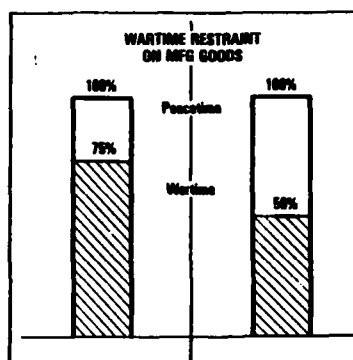
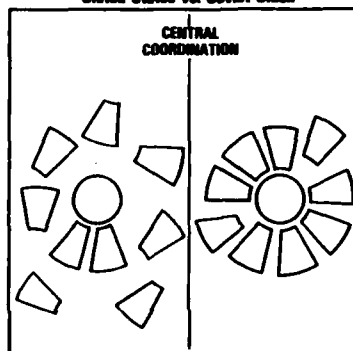
NATIONAL COORDINATION OF CIVIL SECTORS

• Centralized management and planning of practically all segments of Soviet national endeavors provide for almost automatic coordination of a mobilization effort. Many sectors are at least partially controlled by ex-military personnel, with still-vivid memories of World War II. Accustomed to the discipline of centralized leadership, rather than decentralized competitive initiative, the Soviets are clearly capable of immediate--if not efficient--reallocation of resources, objectives, labor forces, priorities and the like. Such control should enhance the rate at which mobilization efforts could be undertaken. Although the U.S. would presumably institute centralized controls as in World War II, there may be a substantial learning period.

RESTRAINT OF CIVIL CONSUMPTION

• Based on the well-documented sacrifices of the Soviet people during the Great Patriotic War, there can be little question about the ability of the population to "do without" many items (shoes, processed foods, etc.) that would be considered "essential" in Western societies. Nonetheless, it is not possible to reduce such consumption to zero. Further, increased production of some items will be required during mobilization (medical supplies, civil defense equipment, etc.) which, for the purposes of this study, are still considered "civil consumption." In any event, the Soviets are expected to be willing to "tighten their belts" more than the U.S. population.

United States vs. Soviet Union



FACTORS FAVORING LATENT MOBILIZATION POTENTIAL OF:

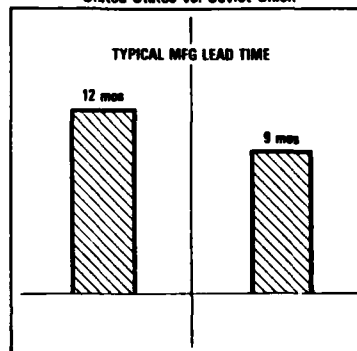
SOVIET UNION

MANUFACTURING LEAD TIMES

● During any mobilization period, there will be an inevitable delay between the time the mobilization is begun and the time newly authorized equipments enter operational inventories. This manufacturing "lead time" will depend on many factors, including design complexity, the availability of stockpiled semi-finished parts, priorities placed on intermediate manufacturers and raw material suppliers, etc. In general, it is anticipated that Soviet manufacturing lead time (on existing designs) would be shorter than in the U.S. For illustrative purposes in a subsequent example, a lead time of 9 months is assumed for the U.S.S.R. vs. 12 months in the U.S.

United States vs. Soviet Union

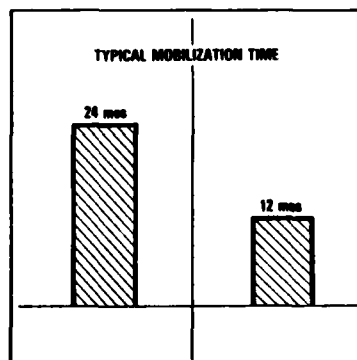
TYPICAL MFG LEAD TIME



TIME REQUIRED FOR FULL MOBILIZATION

● In a total industrial mobilization, both superpowers would have to perform some conversion of factories currently producing non-essential civil goods. The U.S., however, would have to accomplish much greater plant conversion than the U.S.S.R. Despite American ingenuity and customarily short reaction times, it is still felt that it would take the U.S. roughly twice as long to convert civil industry to military production--particularly in view of the far greater level of conversion that would be required to attain maximum military output; 24 months vs. 12 months is used in the subsequent example. These times will vary substantially depending on the specific product involved.

TYPICAL MOBILIZATION TIME



PLAUSIBLE STAGES OF PRE-WAR INDUSTRIAL MOBILIZATION

- The complex chart that follows traces a plausible series of mobilization stages for both the United States and the Soviet Union, for each side's existing manufacturing industry. These stages, which progress inward from the left and right edges of the chart, indicate the used and unused manufacturing capacity of each superpower in terms of workforce manyears--not adjusted for differing productivity--allotted to defense and non-defense production. The factor increase in effective workforce output at each stage for defense production is indicated along with the size of the manufacturing workforce. The stages are as follows:

STAGE A "NORMAL PEACETIME" PRODUCTION

The first bars indicate the portion of each superpower's manufacturing workforce devoted to defense (vs. non-defense), and indicate the theoretical plant capacity in terms of manyears.

B INCREASE PRODUCTION TO "NORMAL PEACETIME" CAPACITY

This step fully utilizes existing defense capacity by adding workforce with the same workweek, and introduces the practical limitation on the maximum attainable factory workweek.

C INCREASE PRESENT WORKFORCE TO MAXIMUM WORKWEEK

This stage increases the workweek to the maximum realizable for each side, using the Stage B workforce, and reduces total capacity by the losses in output due to the longer workweek.

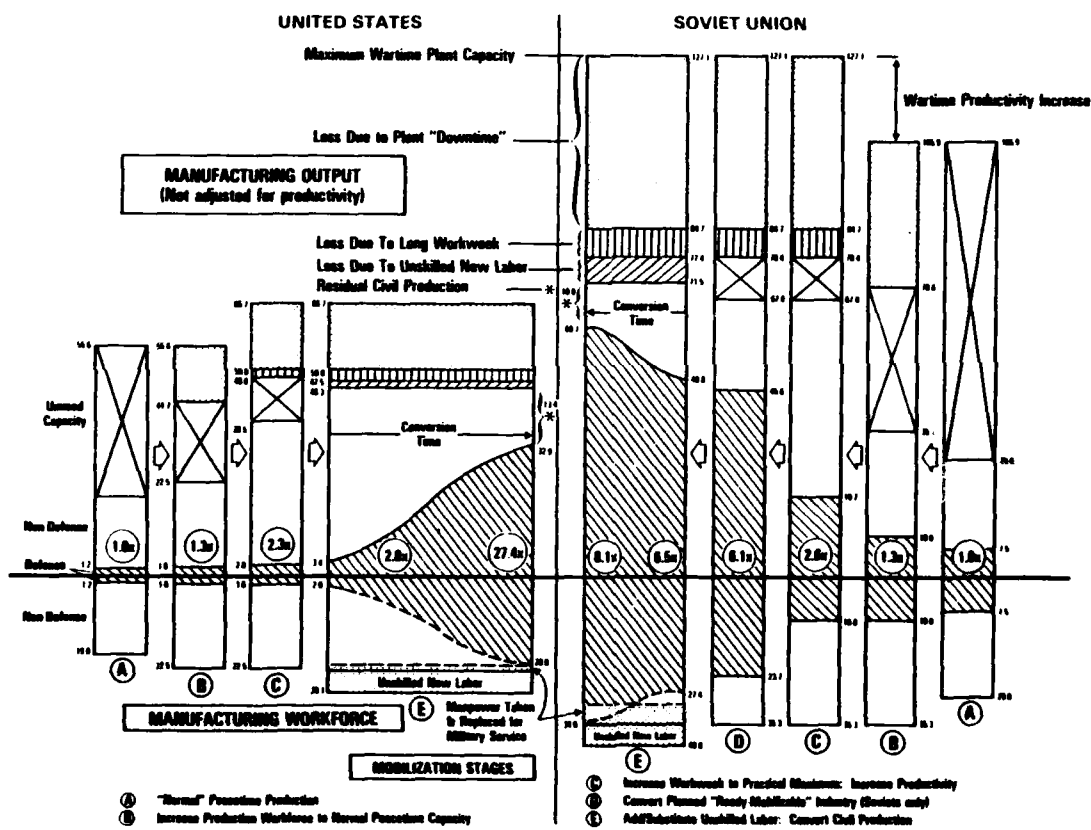
STAGE D CONVERT PLANNED, "READY-MOBILIZATION" INDUSTRY

This step exists only for the Soviets as a result of their extensive mobilization planning and factory design, which permits essentially "instant conversion" of a good portion of their civil production to defense-related equipment.

E ADD/SUBSTITUTE UNSKILLED LABOR: CONVERT CIVIL PRODUCTION

This stage involves the "mobilization period" during which additional industries would be converted to defense production, additional labor and shifts would be added to fully utilize capacity, and reservists would be removed as required from the workforce to fill expanded military ranks. Minimum residual civilian production would be continued, as previously estimated. Each side would convert along an "S-curve," over the duration previously discussed, to a maximum, plant-limited, workforce output limit. Capacity is reduced by effective worker skill levels.

PLAUSIBLE STAGES OF PRE-WAR INDUSTRIAL MOBILIZATION



MAXIMUM PRE-WAR INDUSTRIAL MOBILIZATION OUTPUT

- Using the methods of the previous page, and the assumptions and estimates preceding, it is estimated that the maximum defense-related output would vary as follows during a full-blown mobilization effort:

	United States		Soviet Union	
	<u>Start</u>	<u>Max (in 2 yr)</u>	<u>Start</u>	<u>Max (in 1 yr)</u>
Increase in Defense-Related Manufacturing	2.8x	27.4x	6.5x	8.1x Peacetime Rates

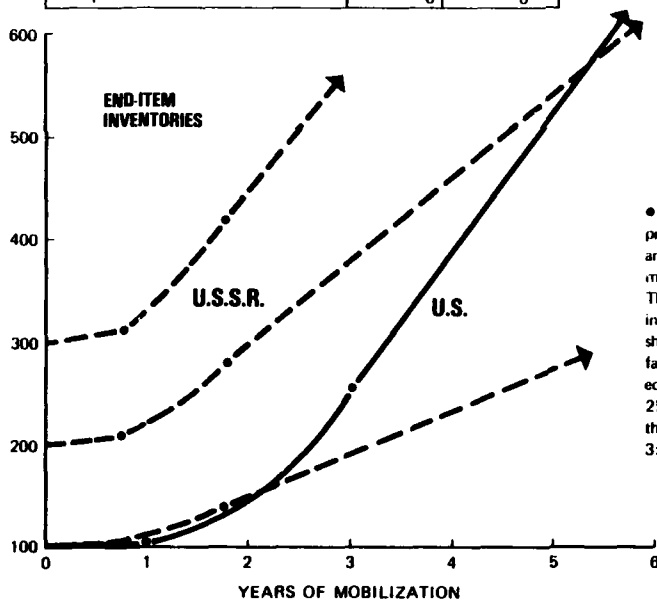
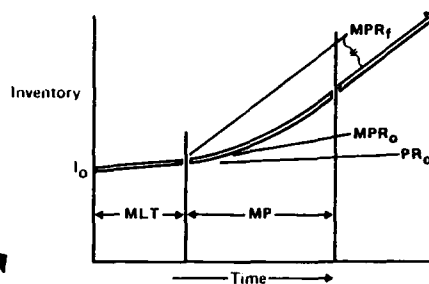
- The values indicated above are used on the next chart to demonstrate the impact of these mobilization potentials on inventory build-ups for some typical, unspecified, military equipment. Note that the issue of relative workforce productivity is by-passed by using ratios of current inventories and production rates.

SOME IMPLICATIONS OF MAXIMUM MOBILIZATION BUILD-UP

- It should be clearly recognized that the industrial mobilization build-ups derived from the prior analysis are intended to represent "latent maximums." As such, they may not be realizable--by either nation--for a variety of practical, real-world reasons. In any event, it appears that the Soviets, either by design or accident, are capable of a substantial increase in military production after only a relatively short mobilization period. This build-up would, in the main, use factories already partially involved in military production, and would almost certainly use equipment designs currently in production. By contrast, the United States, almost without mobilization planning, and having a large civil industrial base not currently associated with defense manufacturing, will have to work much harder to adapt civil plants to military production. This will probably also at least partially involve the use of new military equipments re-designed to be manufacturable in civil-product plants, on civil-product machines, operated by civil-product skilled workers.
- Assuming these significant problems can be overcome--through better planning and pre-war RDT&E--then the relative inventory build-ups of similar equipments for the opposing powers are shown on the following page.

ILLUSTRATIVE INVENTORY BUILD-UPS DURING PRE-WAR MOBILIZATION

MOBILIZATION FACTOR		U.S.	U.S.S.R.
I_0	Initial Inventory	100	100/200/300
UL	Useful Equipment Life	20 yr	20 yr
PR_0	Initial Production Rate	5 yr	5/10/15/yr
MLT	Manufacturing Lead Time	12 mo	9 mo
MP	Mobilization Build-up Time	24 mo	12 mo
MPR_0	Initial Mob. Prod. Rate	$2.8 \times PR_0$	$6.5 \times PR_0$
MPR_f	Final Mob. Prod. Rate	$27.4 \times PR_0$	$8.1 \times PR_0$



• Using the maximum workforce mobilization rates projected on the previous page, this chart presents an illustrative example of how opposing inventories might build up as a mobilization period progresses. The U.S. starts with an inventory index of 100, and initial Soviet inventories of 100, 200, and 300 are shown. The Soviet inventory build-up will progress faster than the U.S. even if initial inventories are equal, although the U.S. will take the lead after 2½ years. If the Soviets start with a 2:1 advantage, the U.S. will require 5½ years to "catch up"; at a 3:1 ratio, the U.S. would never match Soviet inventories.

RESULTS OF SIMPLIFIED ANALYSIS

- Results do not confirm intuitive judgments that U.S. industry could eventually overwhelm the Soviets
- The Soviets can undertake mobilization increases faster than the U.S. due to prior preparations
- The U.S. will never "catch up" with Soviet inventories if they start with a significant advantage
- These surprising results appear to stem from the following:
 - Greater Soviet concentration on manufacturing industrial expansion since World War II
 - Greater Soviet peacetime military end-item inventories and peacetime production
 - Far greater Soviet planning and preparation for mobilization
 - Greater U.S. concentration on expanding the services industries
 - Greater U.S. reliance on cheaper foreign production capabilities.
- U.S. would have to undertake a very dramatic "ad hoc" mobilization effort to keep from losing ground relative to the Soviets in inventory ratios
- U.S. will have to do far more extreme plant conversion and design substitutions
- U.S. will probably have to emphasize counter-systems rather than try to match inventories
- U.S. probably has a substantially greater capability to use existing civil sector capital stocks if suitable conversions to military use can be made
- The Soviet manufacturing industry appears to have evolved with mobilization in mind--the U.S. manufacturing industry has favored efficiency, profit, and non-government control instead
- U.S. mobilization is plant and design conversion limited--Soviet mobilization is ultimately manpower limited.